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दरवाजा-सेट — विशिष्टि

(पहला पुनरीक्षण)

Fire Doors and Doorsets —
Specification

(First Revision)

ICS 91.060.50; 13.220.50

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Fire Safety Sectional Committee had been approved by the Civil Engineering Division Council.

One of the fire safety requirements to be taken into consideration while planning and designing industrial and non-industrial buildings is to provide the means for restricting spread of fire, both internally and externally. The spread of fire can be minimized if the respective floor areas are limited and divided into smaller sections, each section being separated by perfect separating walls and openings therein fitted with fire doors. The design of fire doors and the materials to be used in their construction have to be such that the doors are capable of providing an effective barrier to the spread of fire and smoke.

This standard was published in two parts. Part 1 was published in 1966 providing therein adequate guidance to both the manufacturer and the user in regard to materials to be used and construction to be adopted for fire-check doors capable of giving the required fire protection. Part 2 of the standard published in 1992, covered the fire resistance test and the performance criteria thereon. Ever since the publication, lot of improvements and developments including in the construction material and construction technology of fire rated doors had taken place. This revision aims to comprehensively cover provisions relating to various aspects of fire doors, which are currently followed around the world.

Fire protection, and stopping the fire and smoke from spreading has gained significance, as safety and security of human life has been a prime concern. The availability of vast experience based on the usage of fire rated doors, latest knowledge related to fire and smoke management, the revision of Part 4 'Fire and Life Safety' of National Building Code of India 2016 and other information including standards worldwide have provided inputs to this revision of the standard. There are lot of stakeholders involved and the common understanding related to the requirement of fire and smoke check needs to be comprehensively dealt. This standard has been revised comprehensively to give a better understanding of the requirements right from the design of the product, its manufacture and through its actual application and compliance for safety of human life and property.

In this revision, significant modifications have been carried out in revamping the provisions right from the definition of fire door to the testing of the product, supply, installation and handing over/commissioning. Some of the major changes in this revision are highlighted hereunder:

- a) Scope of the standard has been widened to cover fire door assembly, hardware, etc.
- b) Relevant provisions have been aligned to those given in Part 4 'Fire and Life Safety' of National Building Code of India 2016.
- c) Terminology has been updated in line with those in National Building Code of India 2016 and as per other international literature.
- d) Fire doors have been classified as insulated and uninsulated.
- e) Four types of fire door, with individual requirements have been covered.
- f) All hardware that are part of the door/frame/assembly have been specified to be in line with manufacturing requirements of the fire door, emphasizing the important role of fire door manufacturer towards ensuring the intended performance.
- g) Fire test requirements have been intended for the complete assembly of fire door.
- h) Automation of sliding doors and rolling shutters has been introduced.
- j) Provisions on material handling and installation to ensure that product performs to the intended use has been introduced.
- k) Validity of test certificates has been specified including when there is a change in component(s) or manufacturing process.

(Continued to third cover)

Indian Standard

FIRE DOORS AND DOORSETS — SPECIFICATION

(*First Revision*)

1 SCOPE

1.1 This standard lays down quality requirements including the requirements regarding materials and details of construction of fire rated metal swing doors, wooden composite swing doors, metal sliding doors and metal rolling shutters. The standard also provides requirement on the supply, installation and maintenance of fire door assemblies. This also covers the protection of door openings or the wall openings where the fire door is to be installed, and also floors and ceilings from the spread of fire and smoke within, into or out of a building so as to ensure proper compartmentation.

1.2 This standard does not cover doors which are horizontal or vertical sliding and swinging doors that are used in hoist way doors for lifts and dumb waiters. Fire safety curtains and vault doors are also not covered in this standard.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

3 TERMINOLOGY

For the purpose of this standard, the following definitions and terms shall apply.

3.1 Active Leaf — The first operating door of a pair door/double leaf door, which is usually the door on which a lock is installed.

3.2 Ambient Temperature — The temperature of the laboratory room in which the tests are conducted.

3.3 Anchor — A mechanical device for attaching frames to the surrounding structure.

3.4 Approved — Acceptable to the competent authority.

3.5 Astragal — A vertical or horizontal moulding or strip usually metallic, attached to the meeting edge of one leaf of a pair of doors (double leaf doors) to protect against weather conditions, to minimize the passage

of light between the door leaves, and/or to retard the passage of smoke, flame or gases during a fire; and, in the case of a half door, to ensure that the lower leaf of the door closes in conjunction with the upper leaf.

3.6 Competent Authority — An organization, office or individual responsible for enforcing the requirements of a standard, or for approving equipment, materials, an installation, or a procedure.

3.7 Automatic Closing Device — A device, attached to a door or window frame, that causes the door or window to close when activated as a result of a predetermined temperature, rate of temperature rise, smoke, or through a combustion detector. Activation may also be through a building management system (BMS).

3.8 Automatic Closing Door — Door that opens and closes once the automatic closing device is activated.

3.9 Binders (Sliding Door, Horizontal and Vertical) — Pieces of hardware used to hold a sliding door to the wall, preventing lateral movement of the door from the wall.

3.10 Bi-parting Door — A vertically sliding door in which half of the door moves up and half of the door moves down in order to open, or a horizontal sliding door in which one door moves to the right and one moves to the left in order to open.

3.11 Borrowed Light — A stationary window unit that is installed in an interior partition that allows the passage of natural or artificial light from one area into an adjoining space.

3.12 Bottom Bar [Rolling Shutter (Metallic)] — A structural reinforcing member at the lower edge of the door curtain assembly.

3.13 Box Track — Type of track used with sliding doors that is formed from a sheet of steel and shaped as box.

3.14 Brackets [Sliding Door (Metallic), Rolling Shutter (Metallic)] — Plates bolted to the wall or to extensions of the guide wall angles that serve to support the barrel and form end closers for the hood.

3.15 Builder's Hardware — All hardware that are independently tested for durability, usage and individual type testing for fire rating. All hardware to

be used on fire rated door shall be components of a fire door assembly, supplied by the door manufacturer as a unit but may be installed at site.

3.16 Bumpers (Sliding Door) — Stops, installed to limit the closing or opening movement of a sliding door.

3.17 Centre Latch — A latch used to hold the two halves of a bi-parting fire door together, which is usually in two pieces surface-mounted to doors and interlocked in the closed position.

3.18 Chafing Strip (Sliding Door) — A metal strip applied to the back surface of a sliding door to protect the door surface from damage from the wall.

3.19 Channel Frame — A frame that consists of head and jamb members of structural steel channels, either shop assembled or field assembled, to be used with masonry walls.

3.20 Closing Device — A means of closing a door from the partially or fully opened position.

3.21 Door Coordinator — A device used on pairs of swinging doors that prevents the active leaf from closing before the inactive leaf closes.

3.22 Door Closer — A mechanical hydraulic device that, where applied to a door and frame, causes an open door to close by mechanical force. The closing speed can be regulated by this device.

3.23 Door Holder/Release Device — A fail-safe device, controlled by a detection device, used on an automatic closing door to release the door at the time of fire.

3.24 Double Egress Doors — A pair of swinging doors, each leaf of which swings in the opposite direction of the other.

3.25 Dutch Door — A door divided horizontally so that the lower part can be shut while the upper part remains open.

3.26 Egress Side — The side of an opening from which people (traffic) exit.

3.27 EPDM Gasket — Gaskets made of ethylene propylene diene monomer rubber to prevent movement of smoke from one side to other in a draft control test.

3.28 Finish Frame — A frame attached to a sub-frame (rough buck), to which the door is attached.

3.29 Fire Door — The door component of a fire door assembly.

3.30 Fire Door Assembly (Doorset) — Any combination of a fire door, a frame, hardware, and other accessories that together provide a specific fire resistant

rating to the opening in terms of its integrity and insulation properties when installed in the openings.

3.31 Fire Door Frame — A component, forming the perimeter of an opening in a fire door assembly, that is supplied in fabricated or knock-down condition, and anchored to the surrounding structure and to which the door leaf is attached.

3.32 Fire Door Frame for Lights — A fire rated frame that, in addition to a door opening, contains an opening(s) for use with glazing materials. Various types include transom light, side light, and transom and side light frames.

3.33 Fire Door Frame for Panels — A fire rated frame that, in addition to a door opening, contains an opening(s) for use with fixed panels of solid metal. Various types include transom panel, side panel, and transom and side panel frames.

3.34 Fire Resistance Rating — The time, in minutes, that material(s) or assemblies will withstand the standard fire exposure as established in accordance with standard method of test for integrity or integrity along with insulation properties.

3.35 Flush Bolts, Automatic — A mortised bolt installed near the top or bottom of the inactive leaf of a pair of doors that holds the inactive leaf in a closed position and is released automatically when the active leaf is opened.

3.36 Flush Bolts, Manual — A mortised bolt installed near the top or bottom of the inactive leaf of a pair of doors in which the bolts are manually extended or retracted into or out of the head member or sill by means of a lever.

3.37 Fusible Link — Two pieces of metal held together by low melting point solder.

3.38 Glazing Clips/Beading — Steel clips or beading used to hold glass in place in vision pane.

3.39 Glazing Material — A transparent or translucent material used in fire door assemblies and fire windows.

3.40 Governor [Sliding (Vertical), and Rolling Steel Doors] — A mechanical device that limits the speed of descent of the door during automatic closure.

3.41 Guide [Sliding (Vertical), and Rolling Steel Doors] — Vertical assembly in which the curtain travels and that is fastened to the jamb, retaining the edges of the door curtain and closing the space between the curtain edges and the jamb.

3.42 Guide Rail [Sliding Door (Vertical)] — A steel member, attached to the wall or frame, used with vertical sliding doors to guide the door.

3.43 Guide Shoe [Sliding Door (Vertical)] — A member attached to vertical sliding doors used to guide and retain the door on the guide rail.

3.44 Guide Wall Angle [Sliding (Vertical), and Rolling Steel Doors] — The component of the guide assembly that is fastened to the jamb.

3.45 Hanger [Sliding Door (Horizontal)] — A member used to attach a horizontally sliding door to track and to cause the door to roll on or in the track.

3.46 Heat-Actuated Device — Devices that include fixed temperature releases, rate-of-temperature-rise releases, and door closers with hold-open arms embodying a fusible link.

3.47 Hollow Metal Door — A set of door frame and sandwiched shutter made of galvanized steel or stainless steel (commonly of the flush type), fabricated of sheet steel and reinforced by light metal channels, and has a hollow core, sometimes filled with a light filler material.

3.48 Hood (Rolling Steel Door) — A sheet metal housing that mounts horizontally between the brackets, serving as an enclosure for the coiled rolling shutter and closing the space between the door coil and the lintel.

3.49 Impact Switch — A device that can be attached to a power-operated fire door to stop or reverse the closing motion of a power-operated door upon meeting an obstruction.

3.50 Inactive Leaf — The leaf of a pair of door leaves that ordinarily is latched closed (the other being the only operating leaf).

3.51 Integrity — Ability of a separating element of building construction, when exposed to fire on one side, to prevent the passage of flames and hot gases or the occurrence of flame on the unexposed side.

3.52 Insulation — Resistance to temperature rise on the unexposed face up to a maximum of 180 °C at any single point and a maximum average temperature of 140 °C.

3.53 Intumescent Seal — The seal used to impede the flow of heat, flame or gases, which only becomes active when subjected to elevated temperature.

NOTE — Intumescent seals are components which expand, helping to fill gaps and voids, when subjected to heat in excess of the ambient temperature.

3.54 Keeper — A guide and a restraint used on latching devices.

3.55 Knocked Down Frame — Door frame furnished by manufacturer in three or more basic parts for assembly in the field.

3.56 Labelled — Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization (that is acceptable to the competent authority) concerned with product evaluation, that maintains periodic inspection of production of labelled equipment or materials, and by whose labelling the manufacturer indicates compliance with appropriate standard(s).

3.57 Lap-Mounted Door [Sliding Door (Vertical, Horizontal), Rolling Steel, Swinging Door] — Doors mounted on the face of a wall and overlapping the opening by a prescribed dimension.

3.58 Latching Device — A spring-loaded latch bolt or a gravity operated steel bar that, after release by physical action, returns to its operating position and automatically engages the strike plate when it is returned to the closed position.

3.59 Lintel — A horizontal member spanning and carrying the load above an opening.

3.60 Louvre, Automatic — An opening in a door with a series of slats or blades to allow passage of air and designed to close automatically in the event of fire.

3.61 Mullion — A fixed or removable vertical member set in a double door opening that allows both leaves to be active or set between a door and a side light or a separate framed, glazed area.

3.62 Muntin — A bar member supporting and separating panes of glass within a sash, door, or glazing frame.

3.63 Power-Operated Fire Doors — Doors that normally are opened and closed electrically, pneumatically, or mechanically.

3.64 Self-Latching Bolt — An automatic-latching device that engages in a keeper to hold a door leaf in a closed position and that can only be released manually.

3.65 Service Counter Door — A labelled fire door assembly used for the protection of openings in walls where the primary purpose of the opening is for non-pedestrian use, such as counter service for food, a pharmaceutical dispensary, package and baggage transfer, or observation ports.

3.66 Side Light — An opening in a fire door frame alongside the fire door opening that is filled with glazing material.

3.67 Side Light Frame — A fire door frame prepared for the application of a glazing material alongside the door opening.

3.68 Side Panel Frame — A door frame prepared for the installation of a fixed solid metal or wood panel alongside the door opening.

3.69 Single-Point Latch — A latch located in the edge of a door to engage either in the frame or in the edge of the inactive leaf of a pair of doors.

3.70 Sliding Hardware — A system of rails, hangers, rollers, guides, binders, and closing devices that are self-closing by means of gravity, weights, and pulleys or spring actuated devices.

3.71 Smoke Detector — A device that senses visible or invisible particles of combustion.

3.72 Spring Hinge — A closing device in the form of a hinge with a built-in spring used to hang and close the door.

3.73 Spring Release Device [Sliding Door (Vertical, Horizontal), Rolling Steel Door] — A device that, when activated, releases part of the spring counterbalancing force and causes the door to close.

3.74 Stay Rollers [Sliding Door (Horizontal)] — A device used on horizontally sliding doors at their back lower corners to guide the door and prevent the door from moving away from the wall under fire conditions.

3.75 Electric Strike — A strike that, when activated, either releases or retains a projected latch or dead bolt.

3.76 Open Back Strike — A strike applied to the inactive leaf of a pair of doors and cut away at the back to allow either leaf to open or close independently.

3.77 Strike Plate — A wear plate for projecting hardware or a wear plate and keeper for a latch bolt.

3.78 Struts — Adjustable vertical members that extend from the head of the hollow metal door frame to the ceiling to hold the frame rigidly in place.

3.79 Swing-in Door — A door that swings into a room or building.

3.80 Swing-out Door — A door that swings out of a room or building.

3.81 Three-point Latch — A self-latching device designed to latch a door at the top, bottom, and edge by an interconnected mechanism so that all latches operate simultaneously.

3.82 Track Binder [Sliding Doors (Sheet Metal)] — A device mounted on a sheet metal sliding door that projects behind the track to prevent the door from moving away from the wall under fire conditions.

3.83 Transom — An opening in a fire door frame above the door opening that is filled by a solid panel or with glazing material.

3.84 Transom and Side Light Frame — A fire door frame prepared for the application of a glazing material above and alongside the door opening.

3.85 Transom and Side Panel Frame — A fire door frame prepared for the application of solid metal or wood panels above and alongside the door opening.

3.86 Transom Light Frame — A fire door frame prepared for the application of a glazing material above the door opening that has a horizontal member, such as a transom bar provided to separate the glazed opening from the door opening.

3.87 Transom Panel — A panel, fixed or removable, installed in a frame above the door.

3.88 Transom Panel Frame — A fire door frame prepared for the application of a transom panel above the door opening that has a horizontal member, such as a transom bar provided to separate the transom opening from the door opening.

3.89 Vent [Sliding Door (Horizontal, Tin Clad Only)] — A hole cut in a fire door to allow for venting of the products of combustion.

3.90 Window Ventilator — The part of a projected window, casement window, or pivoted window that opens.

3.91 Viewer — A viewing device installed in a door to allow observation of persons opposite the security side (inside) of the door without having to open the door.

3.92 Wedge [Sliding Door (Horizontal, Tin Clad), and Flush Sheet Metal] — A plate mounted on the face of a sliding door designed to force the door against the wall.

4 DETERMINATION OF FIRE RESISTANCE OF DOORS

4.1 The fire resistance of a door assembly shall be determined by subjecting a full-size construction to test in accordance with the procedures laid down in IS/ISO 3008-1. The test standard requires the tested construction to be fully representative of the assembly to be used in practice in terms of materials and methods of construction, size, number of leaves and mode of operation including all glazed openings and essential building hardware.

If the provision of supplies made is already covered by the specimen tested earlier or covered under third party certification programme, then additional tests may not be required for determination of fire resistance of doors, except under following circumstances:

- a) Change in design and construction of door including infill material.
- b) Overall perimeter of the door, width and height or total area is more than the tested specimen. This is applicable for both, doors with or without vision pane.

- c) Change in size of the vision glass or vision pane.

NOTE — Vision pane on a fire door shall not be more than 0.12 m² for uninsulated door and in case of insulated door, it shall be not more than 0.06 m². For other provisions of vision panes, *see* 6.

- d) For doors with continuous partitions as a part of an assembly or fixed glazed partitions, it is necessary to provide assessment report from approved laboratory based on one or more combination of test reports. These reports shall be validated for integrity or integrity along with insulation.
- e) Time gap of testing should not exceed five years. However, in case of any material and design change, it should be tested and certified once again.

4.2 The fire resistance is expressed in terms of the number of minutes for which the assembly meets the relevant criteria, that is, integrity and insulation or only integrity in accordance with this standard, the details of which shall be included in the report.

For the purpose of classification of fire resistance, doors are classified to the last specific fire resistance period that has been passed during the test before failure occurs. Where more than one criterion is assessed during the test, it is possible that for each of these criteria, a different classification period might apply.

5 CLASSIFICATION OF FIRE DOORS BASED ON FIRE RESISTANCE

5.1 The manufacturers shall follow a standard procedure for labelling the product as per the following criteria. Fire ratings for fire door assemblies are given in minutes and prefixed by the letters 'FD' that is, FD 30 equates to a 30 min fire door or doorset.

Fire doors shall be tested for the criteria as listed below along with the minimum requirements in Table 1:

- a) Integrity
- b) Insulation

5.2 Insulated Door

Insulated doors shall be tested for both integrity and insulation and designated accordingly. For example, if a door has passed 120 min of integrity, and 30 min of insulation, then it is designated as 'FD 120 with 30 min insulation'. The provision of this standard requires any insulated fire door to have a minimum insulation fire resistance period of 30 min.

5.3 Uninsulated Door

A door tested for fire rating of integrity only and not requiring any minimum insulation shall be considered as uninsulated door. The door shall be designated accordingly. For example, if a door has passed 120 min of integrity alone and no insulation or for insulation less than 30 min, it is designated as 'FD 120'.

5.4 Maximum fire rating (integrity) for hinged type door is 180 min and for rolling shutters, 240 min.

Fire door label shall show whether the door is insulated or uninsulated and the rating for both integrity and insulation with the manufacturer's details and door classification (*see* 7).

The testing procedure shall be as given in 4.

6 VISION PANE ON FIRE DOORS

Fire doors can be fitted with glazed vision pane. However, vision panes are sensitive to the substrate into which they are fitted. Vision pane should only be cut into doors that are designed to receive apertures. Vision pane should therefore only be fitted into a fire door under the control of fire door manufacturer. Apertures should not be cut on-site. The glass should not exceed in area or any of the dimension of that previously tested specimen (perimeter or square metre).

Maximum allowed size for a vision pane (glass) or pane is 0.12 m² for uninsulated door. For insulated doors the maximum glass shall not exceed more than 0.06 m². The glazing material (glass) shall remain clear fire rated for

Table 1 Classification of Insulated and Uninsulated Door with Fire Rating

(Clause 5.1)

SI No.	Fire Door Classification	Uninsulated Door		Insulated Door	
		Integrity min	Insulation min	Integrity min	Insulation min
(1)	(2)	(3)	(4)	(3)	(4)
i)	FD 30	30	NA	30	30
ii)	FD 60	60	NA	60	30
iii)	FD 90	90	NA	90	30
iv)	FD 120	120	NA	120	30
v)	FD 180	180	NA	180	30

the entire duration of intended test (for integrity) of the door assembly. Wired glass shall not be used as vision pane; also interlayered glass or laminated gel glass, that becomes opaque and affects visibility shall not be used.

Wherever, the user/application requires larger vision pane, the overall glass area can be increased by up to 15 percent of the door leaf size, provided the door has been tested with a larger glass. Such increase is not applicable for any insulated door.

Each individual glazing unit shall be identified with a label of the glass manufacturer with intended rating. The label shall be visible after installation.

NOTE — Apertures other than those used for vision pane should be discussed by the purchaser with the fire door manufacturer.

7 TYPES OF FIRE DOORS

7.1 Fire doors shall be of the following types:

- a) Fire rated hinged doors (Metallic),
- b) Fire rated hinged doors (Wooden composite),
- c) Fire rated sliding doors (Metallic), and
- d) Fire rated rolling shutter (Metallic).

7.2 Fire Rated Hinged Doors (Metallic)

This covers all types of fire rated hinged door (both insulated and uninsulated) which are metallic (also known as the hollow metal door or sandwiched panel door). The overall specification covers sizes, design, materials, general construction requirements and finishing of standard steel fire doors and frames. It is intended to define standard items not subject to variations. The products defined herein should have demonstrated successful performance to established.

7.2.1 Material

Zinc coated steel shall be of the alloyed type and shall conform to IS 513 (Parts 1 and 2) or IS 277. The coating weight shall meet or exceed the minimum requirements for coatings of 120 g/m², total of both sides.

When zinc coated steel is specified for anchors and accessories, and electrolytic alloy deposited zinc coated steel shall be provided. Materials like embossed design, grained steel design can be used as fire doors for better aesthetics, duly covered under galvanized material. Surface interior finishes on the doors, if any shall not compromise the construction integrity of the doors.

Alternative materials like stainless steel or laminated steel may be used in fire doors when tested and comply to all requirements of this standard. Test certificates for galvanized steel shall not be used for stainless steel doors and *vice-versa* as the composition of material changes, and so is the performance of the door.

7.2.2 Sizes

The maximum door way opening size for any hinged fire door compartment shall not exceed 7.2 m² with the maximum permissible width of 2.4 m and height of 3.0 m.

NOTE — The maximum area of door can be increased for specific requirement as mutually agreed to between the parties. This will be based on clause of field of direct application. However the same shall not be applicable for insulated doors.

7.2.3 Construction

Construction shall be of the type of fire door and frame assembly that has been investigated and successfully fire tested in accordance with this standard. The assembly shall be identified by label(s) and/or an approved identification marking of the certification agency accepted by the competent authority. The door label shall indicate the applicable fire test rating for the door construction furnished, as per 5.

7.2.4 Fire Door Frames

Fire door frames are not affected by the fire resistance ratings that apply to doors. There is no fire rating for a basic fire door frame unless the labelling on the frame specifically states that the frame is rated for fire rating as a complete assembly including door leaf and hardware. The minimum steel sheet thickness recommended for frames shall be 1.2 mm (18 gauge) for a frame depth of 150 mm. Any addition in depth shall eventually change or require higher sheet thickness of at least 1.6 mm (16 gauge) and with provision for additional anchors as per the tests indicated and/or those mutually agreed to between the parties. Also, higher thickness of material can be used. Door frames shall have grooved profile with provision for smoke seal in either single rebate or double rebate, with or without architrave, all tested as an assembly.

Alternatively, any change in the frame design shall be either confirmed by third party certification and approval as per the requirement or by new type test depending upon the approval of the authority under whose jurisdiction the product may be used. The maximum depth of the fire rated frame shall not be more than 350 mm. All types of frames either as an assembly or, otherwise shall conform to the requirement of this standard.

Frame design and construction shall be as per the tested specimen both for single and double rebate profile. Frames can be supplied in butt, mitered or welded assembly, with proper reinforcement and protection for taking required hinges, locks and strike plates, including door closers.

Fire rated EPDM (ethylene propylene diene monomers) or suitable fire rated gaskets are required for doors to

control the spread of smoke. A bottom seal may not be required for smoke and draft control assemblies.

NOTES

1 If there is any other combination, the entire assembly needs to be tested.

2 Fire rated door assembly tested with 1.2 mm thick steel frames can be manufactured with increased sheet thickness of the specimen tested to meet the durability and operational requirement. For example, if 1.2 mm frame is tested and approved, use of higher thickness 1.6 mm can be acceptable, without any additional test. However, reducing the sheet thickness of the tested specimen sample to meet any specific requirement shall not be permitted. Similarly, by increasing the sheet thickness, manufacturer shall not exceed the size (width/height) or intended duration of the specimen tested.

7.2.5 Door Leaf

There are various constructions used for the manufacture of fire doors. These can be used in a number of configurations, which vary from single leaf and double leaf single swing, with a possible option for storey-height doorsets using transoms or flush-over panels. It is important to note that doors tested in one configuration might not be suitable for another configuration.

Single skin door leaf shall not be used as fire doors. Doors tested with single skin shall not be part of this standard.

For 120 min fire door, the minimum sheet thickness recommended for door leaf shall be 1.2 mm (18 gauge) for uninsulated and insulated door. Door leaf with 60 min rating shall be with minimum 0.8 mm (20 gauge), provided they satisfy the requirement of fire door testing. The maximum door leaf width for single leaf shall not exceed 1 250 mm in width and the provision of maximum door width and door height shall be in line with the sizes as mentioned in 7.2.2.

The infill material used, shall be resin bonded. Materials like resin bonded honeycomb paper core, mineral wool, ceramic wool and proprietary material may be used as infill, provided they satisfy the requirement of fire door rating. Polyurethane foam (PUF) as an infill material for fire doors shall not be permitted.

The performance of the door varies based on the infill material and hence interchanging the infill material to satisfy the requirement shall not be permitted without carrying out additional tests. Doors shall be tested for different categories as insulated and uninsulated door.

The maximum allowable limit for bottom undercut of the door shall not be more than 19 mm for doors fixed on the floor. In case of a door fixed on sill (where the bottom of the door is above the floor level, say by 100 mm and above), the undercut should not be more than 9 mm. The maximum undercut a door manufacturer can provide shall be based on the test evidence.

The internal construction of the door shall be provided with rigid reinforcement in addition to the core. All

double leaf fire door assembly shall be provided with and tested with astragals to ensure compatibility with actual fire performance.

7.2.6 Intumescent Seal

It is mandatory for the door manufacturer to test and supply insulated doors with intumescent seal. There are various types of intumescent seals, all of which can react differently. Intumescent seals shall be provided by the fire door manufacturer on all three sides of the door leaf and on the meeting stile of the double leaf door or as per test evidence. Alternatively, the same can be provided on the frame and meeting stile of the double leaf door. It is essential that the intumescent seal to be used is of the same formulation, dimensions and configuration as that in the door manufacturer's fire test report.

Intumescent seal provided on the door leaf shall expand in the event of fire closing the gap between the frame and shutter. This should be independent of smoke seal, which is fixed either in the grooved frame profile or stuck with adhesive on the entire perimeter of the frame.

NOTES

1 All fire doors are required to have smoke seal and intumescent seal as standard component of the door assembly.

2 There are different types of smoke seals available, and the most appropriate type shall be chosen.

7.2.7 Vision Pane

The provision of glazing and glazing material should be in line with the maximum permissible limit outlined in 6 and Table 2. The hourly rating of the door dictates the type of door and the maximum size of the vision panes used on the door.

Table 2 Vision Pane for Fire Rated Doors
(Clause 7.2.7)

Sl No.	Type of Door	Maximum Width	Maximum Height	Maximum Area
		mm	mm	m ²
(1)	(2)	(3)	(4)	(5)
i)	Uninsulated door	400 (height 300)	800 (width 150)	0.12
ii)	Insulated door	200 (height 300)	400 (width 150)	0.06

7.2.8 Louvres

Fire rated louvres can be used on fire doors subject to the same have been tested as a complete assembly on a fire door and labelled. It can be used and shall not exceed maximum area of 0.135 m², maximum width of 300 mm and maximum height of 450 mm. Doors with glass lights, or doors equipped with fire exit devices may not have louvres. All louvered fire rated doors shall have label indicating the size of the louvres and the test certificate reference of the louver's manufacturer.

7.2.9 Builder's Hardware

All hardware used on fire doors shall be fire rated, and certified except for hinges, if it is of minimum size 100 mm × 75 mm × 3 mm and in stainless steel of grade SS 304 and above. Similarly, pull handles may not require specific fire rating if it is in stainless steel of grade SS 304 and above. All other mechanical and functional hardware like, locks, panic devices, lever handles, door closers, shall be type tested and certified for use on fire doors for specified rating and need not necessarily part of specimen testing as detailed in 4.1. Third party certified products from approved certification body may be used as a component if it satisfies the requirements for use on fire door. Individual test certificate for hardware shall be obtained from the approved test agency or copy of type test carried out by the manufacturer not earlier than five years may be submitted. All hardware shall carry appropriate label as per best practices for fire rating and the test certificates shall be made available for evaluation by the competent authority.

Products which are not covered under the Indian Standards may be used on fire doors provided the same are type tested tested or used on specimen door and certified for use on fire doors with respective fire rating. Since the nature of hardware is based on application and function, the certified products can be used on fire doors as long as they satisfy the requirement of intended fire rating.

The provision of latched and unlatched door is applicable on all fire doors without any modification of the standard requirement. If the door is tested in latched condition with lever handle, then the manufacturer shall supply the doors only in latched condition. Use of dead lock (without latch only cylinder operated) on fire doors is allowed subject to the door being tested in unlatched condition, wherein the door is held in position with the pressure of door closer. Shaft locks shall be type tested for fire door application as they may not be cylinder operated.

The hardware include hinges, locks and latches (lever operated), lever handles, exit devices, door closers (concealed and surface mounted), flush bolts (mechanical or automatic), seals and thresholds. In addition, it shall also include all electrified hardware like electric strike, magnetic locks and motorized locks and closing devices.

The door manufacturer shall ascertain the use of particular hardware with proper certification. If the door manufacturer is not supplying hardware as part of the assembly, then the door shall be construed as non-fire rated and shall not be acceptable to authorities having jurisdiction. The standard makes it mandatory on the door manufacturer to supply the hardware along with glazing material as a complete system, so that there is no scope of deviation in the functionality and

performance of the product. The following hardware shall have labels, without which the fire door shall not carry any label of certification:

- a) *Locks, latches and dead bolts* — Visible label of certification on lock for end for fire rating along with proper certification.
- b) *Emergency exit devices (panic devices)* — Visible label of certification on the panic devices with proper certification. Towards the use of panic devices, the same is allowed as projections in clear width of the door(s).
- c) *Door closers* — Visible label of certification on the door closer body (does not include covers). Mechanical hold-open units are not allowed on fire rated doors.
- d) All fire doors shall be equipped with proper EPDM smoke seals to limit the spread of smoke. Other seals like door bottoms, surface mounted and perimeter seals can be used in addition to smoke seals, subject to the requirement or for acoustic doors.
- e) *All hardware* — Visible label of certification on all accessories which are directly related to the performance rating of fire doors.
- f) Door eye viewer shall be fire rated to the same rating as of the door but limited to 60 min for fire doors of rating above 60 min. The maximum size of the hole shall not be more than 19 mm, factory prepared for receiving the hardware. No modification shall be carried out at site.
- g) Signs can be fixed on the door by using adhesives and the overall size of the signage shall not be more than 5 percent of the face of the fire door leaf on which it is attached.
- h) Where the hardware does not come with certified label like electrified hold open devices, door coordinators or stops, then the same has to be certified by the manufacturer of hardware for suitability on use of fire doors with relevant type test certificates.
- j) Door holder/release devices for swinging doors should, wherever possible, be installed at the top of the door as close as possible to the lock edge and should be located to avoid interference with any other hardware. If necessary, the holder/release may be permitted to be located at the bottom of the door as close as possible to the lock edge with the device installed on the wall or floor.
- k) Fire door shall not have the following hardware:
 - 1) Tower bolts,
 - 2) Aldrops,
 - 3) Slide bolts, and
 - 4) Chains with pad locks.
- m) Fire doors shall carry dead bolts (cylinder operated), if the door is tested only in unlatched condition.

- n) Wherever electrified hardware is used, the fire door shall carry electrical conduits inside the door leaf and power transfer between the frame and door leaf for secure transfer of wires.
- p) All fire doors once installed shall be self-closing and all hold open devices shall be electrified and should be actuated by active fire and smoke detector, in case of an emergency.
- q) All double leaf doors shall have concealed lever action flush bolts on top and bottom of the inactive leaf (except panic device door). If the door height is more than 2 100 mm, then the flush bolt shall be with extended rod. Automatic flush bolts can be used as an alternative to mechanical flush bolt, if a door coordinator is used.
- r) Single leaf doors can have single point panic device or two point panic device on the door based on the architectural requirement. However, for a double leaf door only the following combination is allowed:
 - 1) One number of single point latch on the active leaf and one number panic device with vertical shoot bolt on top and bottom on inactive leaf.
 - 2) One number of each panic device with vertical shoot bolt on both top and bottom on active and inactive leaf.
 - 3) Panic bolts without bottom rod is not allowed on fire doors unless the same has been tested and approved on a assembly of doors.
 - 4) If the width of inactive leaf is less than 450 mm, then, one panic device may be allowed. However, the inactive leaf shall still have lever action flush bolts both on top and bottom.
 - 5) All double doors with electromechanical/ electrical devices and/or panic device shall be equipped with door coordinator demonstrating the sequence of closing when opened together at the time of fire approval.
 - 6) Electrified panic device can be used if security is a concern. Security hardware used shall be in fail-safe mode in case of an emergency.
- s) Electromagnetic locks and electrified security locks can be used on all fire doors in combination with other hardware like latches, panic devices provided they are of fail-safe type. Fail secure type cannot be used on any escape routes and exit pathways.

Any further requirement of hardware can be based on the standard for architectural hardware or as per international standard(s).

7.3 Fire Rated Hinged Doors (Wooden Composite)

7.3.1 Material

Timber and timber boards/composite material used in the construction of fire doors shall be of thoroughly seasoned hard wood. The moisture content of any material used in the construction of wooden composite door sets comprises of frame and shutter when used in door set shall not be more than 15 percent, in accordance with IS 287.

7.3.2 Sizes

The maximum door way opening size for any hinged wooden fire door compartment shall not exceed 3.78 m² with the maximum permissible door width shall not be more than 1 800 mm and height of 2 100 m. The door sets shall be factory prepared for all hardware and no work shall be carried out on doors at site.

7.3.3 Construction

Door frames should be supplied by the door manufacturer only, with proper certification and test results for the size of the door sets. The maximum rating for a fire door shall generally be 120 min. The options available being:

- a) 30 min wooden composite doorset,
- b) 60 min wooden composite doorset, and
- c) 120 min wooden composite doorset.

Suitability of different timber species for doorframes shall be checked by the door manufacturer, since some materials are not recommended for door manufacturing.

Rating for fire door assemblies are given in min and prefixed by the letters 'FD' that is, FD 30 equates to a 30 min fire door or doorset. The most commonly specified integrity levels are:

- 1) FD 30 — 30 min (half an hour),
- 2) FD 60 — 60 min (1 h), and
- 3) FD 120 — 120 min (2 h).

All dedicated fire doors providing a half hour or greater performance are usually fitted with intumescent seals. The intumescent fire seal should be encased in a PVC sheath on all four sides and can be of any colour. The intumescent seal should be of adequate size as per the test sample tested at the laboratory. Usually a combination of intumescent fire seal and intumescent fire and smoke seal is placed facing each other on all joints. The joints here are referred as:

- i) Frame and shutter facing each other in case of single leaf that is, on both frame and door leaf.
- ii) Also at shutter to shutter facing in double leaf that is, on the meeting stile of the double leaf door.

The intumescent fire seal shall be independent of smoke seal. The intumescent seal may not be required at the bottom of the door leaf. Intumescent seals may be visible at the head of the door. Intumescent seals shall be minimum 10 mm wide and 4 mm thick for 60 min door and 15 mm wide and 4 mm thick for 120 min door.

Doorsets shall be tested for integrity and insulation, as mentioned earlier.

7.3.4 Vision Pane

Glazing may range from a small vision pane in a door to a glazed screen for maximum light transmission and safety. The same shall not be more than 0.06 m² with the maximum width or height not exceeding 300 mm. Ordinary glass cracks when exposed to heat and is liable to fall out fairly early in a fire. Fire resisting clear fire rated glass shall be used for the intended fire rating.

The size of the glass and the method of its retention are important factors which influence its integrity. As the temperature approaches the softening point, a large sheet will tend to collapse earlier than a smaller one. On the unexposed face, beading retaining the glass is subjected to radiant and conducted heat through the glass and to convection currents at the top of the pane. This can raise the temperature sufficiently to ignite timber beading after about 20 min. To delay the ignition of beading to 30 min, it is necessary to provide protection by impregnation of a surface coating or a surface covering of non-combustible material or fit a fire resistant glass secured using a fire resistant glazing systems which hold the glass firmly in place during normal use, but in the event of fire, the intumescent material expands securing and insulating the glass and protecting the surrounding timber.

For longer periods of fire protection, an improved retention system for the glazing is needed, the glass pane should be small and the method of fixing it should ensure that no direct path can be created for the transference of hot gases.

7.3.5 Intumescent Paints

Intumescent paints and varnishes can be used only on timber-based fire resisting doorsets where a maximum performance of 30 min integrity is required, and not suitable for 120 min door. These products require extremely specific application techniques and are reliant on the underlying condition of the doorset construction. They shall not be used as a substitute in any other condition other than 30 min door. Great care should be taken to ensure that full-scale test data for the product is both available and appropriate for the application.

7.3.6 Builder's Hardware

The provision of latched and unlatched door is applicable on all fire doors without any compromise of the standard requirement. If the door is tested in latched

condition with lever handle, then the manufacturer shall supply the doors only in latched condition. Use of dead bolts on fire doors are allowed subject to the door has been tested in unlatched condition.

This shall be in line with the hardware conditions and application as recommended, *see* 7.2.9.

7.4 Fire Rated Rolling Shutters (Metallic)

The provisions of this standard cover all types of rolling shutters which are tested for fire rating and intended use of compartmentalization of structural opening. This includes both semi-automatic (that work with fusible link) and automatic (completely motorized) rolling shutters. It includes the use of sensors and automation devices including motors to suit various construction requirements. The average closing speed of fire rated rolling shutters shall be 50 mm/s to 100 mm/s.

7.4.1 Material

See 7.2.1.

7.4.2 Size

Fire rated rolling shutter shall suit the structural opening size of maximum 24 m² for a given opening. The maximum width shall not be more than 6 m and the maximum height shall not be more than 6 m. The sizes are measured for the clear structural opening width and height of wall or steel structure.

7.4.3 Construction

7.4.3.1 Rolling shutter

The rolling shutter shall be formed of rolled steel of not less than 0.8 mm or 1.2 mm and 1.6 mm in thickness based on the intended fire rating. Each slat shall be provided on both edges curls to form an inter-locking hinge extending the full width of rolling shutter; the centre of inter-lock shall be not less than 45 mm or more than 75 mm (nor more than 125 mm if the slats are thicker in mm), and the bridge depth shall be not less than 10 mm. The rolling shutter shall extend at least 50 mm into the channel guides.

The rolling shutter shall be secured to the barrel by either of the following methods:

- a) Rings or collars of MS or GI as per IS 6248, not less than three in number, shall be scarves or bolted to the barrel and fixed at centres not exceeding 0.50 m. A flat steel bar at least 25 mm × 6 mm shall be attached to the rings or collars, and the top slat shall be attached to the bar by screws or bolts not less than 8 mm in diameter spaced not more than 300 mm apart; or
- b) Chains shall be of mild steel not less than 1 mm × 12 mm thick and 40 mm wide, each link being formed of at least three layers of strip riveted together with two 3 mm rivets. The links shall be coupled by means of mild steel pins not less than 3 mm in thickness. Each chain shall be

attached to the barrel by screws not less than 8 mm in diameter spaced not more than 300 mm apart and shall be riveted to the top slat of the rolling shutter by at least two rivets not less than 5 mm in diameter, through the connecting link.

The rolling shutter shall be of such a length as to extend from the floor of the opening to the top of the barrel and then round at least a quarter of the circumference of the barrel before fixing to it.

7.4.3.2 End lock

The end lock shall be constructed of steel not less than 3 mm thick, fitted at each end of each slat and welded or riveted thereto with two tinned or black iron rivets not less than 3 mm diameter.

The end locks shall be so designed as to fit the contour of the rolling shutter slats and fill the channel guides as closely as possible, consistent with the movement of the rolling shutter.

7.4.3.3 Bottom rail

The bottom rail of the rolling shutter shall be of T-bar not less than 100 mm and the bottom rail may be built up of two mild steel angles, each not less than 50 mm × 50 mm × 3 mm, one angle to be provided on each side of the bottom slat of the rolling shutter, and both angles to be securely bolted or riveted to the rolling shutter as described before. The rolling shutter shall extend to a minimum depth of 35 mm between the angles or plate and T. Spot welding at maximum of 300 mm centres, *in lieu* of bolting or riveting may also be suitably adopted.

The bottom rail shall extend to the full width of the rolling shutter except for that portion necessary for housing within the channel guides, and shall make close contact with the sill when the shutter is closed.

7.4.3.4 Guides

The rolling shutter shall move in channel guides constructed of galvanized steel or cold rolled steel not less than 3 mm thick extending continuously from within the barrel enclosure to within a distance of not more than 30 mm and not less than 20 mm from the floor of the opening.

The guides shall be of a depth sufficient to allow the rolling shutter to extend at least 50 mm to 65 mm into the guides based on the size.

7.4.3.5 Brackets, supporting axle and roller

The brackets shall be of steel and shall be of enclosed type, arranged to support the bearings of the axle and shall be of sufficient size to close completely the ends of the barrel enclosure.

7.4.3.6 Barrel and axle

The barrel shall be of mild steel tube not less than 80 mm outside diameter and not less than 3 mm in

thickness, mounted on a mild steel axle not less than 25 mm in diameter, the axle shall extend the full length of the barrel with a minimum bearing of 25 mm at each end. The barrel shall enclose helical steel springs for counter-balancing the rolling shutter with or without counterbalancing.

The barrel shall be mounted on rigid or self-aligning ball bearings and be fitted with a spring charging device to enable the spring to be adjusted after the rolling shutter is in position.

7.4.3.7 Barrel enclosure

The barrel shall be completely enclosed with steel pressed casing in an angular or square shape. This should also cover the motor. The thickness of the cover shall be minimum 1.2 mm.

7.4.3.8 Chains

Chains shall be provided instead of handles or angles. The same should be hanging up to a height of 1.0 m from the floor level. This is mandatory for the rolling shutters in case of an emergency or any power failure.

7.4.4 General Requirement of Fire Rated Rolling Shutter

- a) It should be fire rated for minimum 120 min and maximum 240 min.
- b) Power operated fire rolling shutter are those that normally are opened or closed by power. They shall be permitted to be furnished with a sensor that causes the door closer to stop or reverse upon contact with an obstruction under normal conditions.
- c) Power operated fire rolling shutter shall be equipped with an automatic closing device that, upon activation, will cause the door to close irrespective of power loss or operation under normal conditions, and remain closed or be capable of opening and then reclosing until the automatic closing device has been reset.
- d) An automatic closing device (motorized) shall be installed on every rolling shutter.
- e) Rolling shutters shall close automatically upon activation of detector or release of a fusible link.
- f) The automatic closing mechanism shall be enclosed in a metal housing to protect the mechanism from debris and ensure operation in the event of fire.
- g) A governor, where employed on a door, shall be an integral mechanism working in coordination with the closing device and shall control the closing speed of the door.

7.4.5 Operator

The operator shall be of minimum following specification:

- a) Operator/motor of 220 V, 50 Hz single phase type for shutter size up to 5 000 mm × 5 000 mm; and if the size of the rolling shutter is more than the above mentioned size, then the operator shall be of 415 V, 50 Hz, 3 phase. It should be provided along with additional accessories like, one unit push button switch (up, stop, down), and have IP 65 rating.
- b) Motor capacity — 1 H.P., for sizes less than 5 000 mm × 5 000 mm, 3 H.P., for sizes above 5 000 mm × 5 000 mm.
- c) Current rating — 5 Amp for sizes less than 5 000 mm × 5 000 mm, 9 Amp for sizes above 5 000 mm × 5 000 mm,

Additional accessories for fire operation fusible link and 24 V solenoid release, including fire alarm backup panel.

NOTE — See also Part 4 'Fire and Life Safety' and Part 8 'Building Services, Section 2 Electrical and Allied Installations' of SP 7.

For other builders hardware, the requirements as recommended in 7.2.9 shall be applicable.

7.5 Fire Rated Sliding Door (Metallic)

The requirements of the fire rated sliding door including automated sliding door with telescopic sealing arrangement, horizontal single or double (bi-parting) are given hereunder. Doors shall be equipped with self-closing or automatic closing devices to ensure that they shall close or be closed at the time of a fire. Closing devices shall be a system of weights or a certified closing device. Automatic closing doors shall not have a delay of more than 10 s in the initiation of closing or reclosing.

7.5.1 Material

When specified, hot dipped zinc coated galvanized steel shall be of the alloyed type and comply with IS 277. Metallic coating by hot-dip process, zinc-coating or zinc-iron alloy-coating (galvannealing) using hot-dip process may also be used. The weight of coating shall meet or exceed the minimum requirement of 122 g/m² total for both sides.

7.5.2 Sizes

The maximum size of the opening shall be limited to 48 m² and the maximum permissible wall width shall be 8.0 m and wall height shall be 6.0 m. For opening heights above 6.0 m, the manufacturer shall provide relevant certificate of approval. The maximum fire rating for the door shall be 120 min.

7.5.3 Construction of Sliding Door Leaf

7.5.3.1 Sliding door leaf

Flush, fully bonded door with groove/spring element connection of galvanized steel sheet of minimum

0.75 mm thickness without primer-coating shall be used. Thickness of each element shall be minimum 72 mm with the panel depth varying between 230 mm to 1 550 mm each. They shall be connected at factory or in strict supervision at site by internal threaded rods. Maximum individual panel weight should not be more than 180 kg with 30 min insulation for both 90 min and 120 min integrity fire doors.

The system shall be supported by hydraulic soft stop for continuously adjustable closing speed of 0.08 m/s to 0.2 m/s which is invisibly integrated into the weight box. Grip handle and recessed handle shall be provided for manual operation. Integrated floor guide roller with ball-bearing shall be provided for smooth operation. Integrated guidance damper for single-leaf doors and surface-mounted guidance damper bracket for double-leaf doors shall also be provided.

The track shall be cold rolled, galvanized C-profile with three-way adjustable suspension brackets and bolt plug-in connection for a precise track joint. Track wall connection profile may be used to compensate for any irregularities in the wall. Two set of galvanized pairs of rollers with ball-bearing per panel shall be provided. Track should be clad with galvanized sheet steel cover.

Unless tested otherwise, doors shall lap the openings at least 102 mm at the sides and top. Where doors provide protection of openings located in walls above floor level and no projection sill is provided, the doors shall lap the bottom of the opening at least 102 mm.

Attachment of the door assembly to the wall shall be by means of through wall bolts. As an alternate, expansion anchors shall be permitted to be used in concrete, brick or filled concrete masonry unit walls if the requirements in 7.5.4 are met.

7.5.4 General Requirement of Fire Rated Sliding Door

See 11.3.1, 11.3.2 and 11.3.3 for requirements of closing devices, releasing devices and hardware respectively.

7.6 General Requirement of Fire Doors

The fire ratings for 30, 60, 90, 120, 180 min shall be acceptable for evaluation of products and their intended usage and application. This should comply with respective requirement of Part 4 'Fire and Life Safety' of SP 7 based on application.

Fire doors shall be classified based on their intended rating. All fire doors shall be classified and labelled for integrity and for insulation as applicable for insulated doors.

All fire doors shall be identified by a label preferably bearing a unique number.

Where the products are tested and certified by any approved laboratory, the label shall specify the name of the agency and the certificate number.

Labels shall be applied in locations that are easily visible and convenient for identification by the competent authority. All components shall be labelled in fire door assembly as required and shall be considered as evidence that specimens of such devices or materials have been evaluated by test(s) and that such devices or material are manufactured under in-plant and follow-up inspection programme.

Specification of items which are generic in nature, such as hinges, locks, lever handles, closing devices shall be in line with respective standards like IS 208, IS 1341, IS 3564, IS 6315, IS 12817, and IS 14912. Any architectural hardware which does not have a label or supporting third party certification for intended fire rating, shall not be used as a component in the assembly of fire doors. The liability of identification and submission of relevant test documents shall be with the fire door manufacturer, who will be responsible for the system as a complete assembly.

All fire doors shall be provided with fire rated smoke check sealing, which is also applicable for all type of fire doors, swing, sliding and rolling shutters. The performance of fire doors shall include smoke check. Proper seals should be provided to stop the spread of fire and smoke in a building. It is not mandatory to have a door bottom seal, unless desired or the area under consideration is pressurized.

Where sliding fire doors are used, the same shall be labelled for relevant fire rating including all accessories as an assembly.

Rolling steel fire door shall be labelled for required fire rating and shall be furnished as a complete assembly that includes slats, rolling shutters, bottom bars, barrel, guides, brackets, hood, automatic closing devices and any other component required.

For other builder's hardware, the requirements as recommended in 7.2.9 shall be applicable.

8 MARKING AND LABELLING

8.1 The fire door manufacturer shall supply frame and doors with appropriate labels in the prescribed format. The fire door manufacturer shall maintain record of all labels supplied with the following information for evaluation by competent authority:

- a) Name of the project;
- b) Buyer's purchase order number, and address;
- c) Serial number, and the year of manufacture; and
- d) Fire rating, and label details.

8.2 The label shall be affixed on the door leaf that is visible and convenient for identification by the competent authority.

8.3 The label shall contain the following information:

- a) Name of the manufacturer,

- b) Type of fire door,
- c) Fire rating classification (*see* 5),
- d) Serial number of the door,
- e) Year of manufacture, and
- f) Certificate reference number.

8.4 BIS Certification Marking

The product (fire door and doorsets) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product may be marked with the Standard Mark.

8.5 The fire door manufacturer shall provide the test data on request to the concerned authority under whose jurisdiction the product is supplied.

9 STORAGE, HANDLING, AND INSTALLATION OF HINGED DOORS

9.1 Site Storage

All doors and frames shall be stored horizontally under cover. The units shall be placed on at least 100 mm high wood sills or in a manner that will prevent damage including rusting. The use of non-vented plastic or canvas shelters that can create a humidity chamber shall be avoided. A 6.3 mm space between the doors shall be provided to promote air circulation. If the wrapper on the door becomes wet, it must be removed immediately. Proper jobsite storage is extremely important in maintaining the quality and integrity of the factory finish including paint applied, if any. Improper storage of materials will have an adverse effect on the factory finish including factory applied paints.

9.2 Frame Installation

9.2.1 Frames shall be installed plumb, level, rigid and in true alignment as recommended in the erection instructions for steel frames and installation guide for doors and hardware. All frames, other than drywall slip-on types, shall be fastened to the adjacent structure so as to retain their position and stability. Slip-on dry wall frames shall be installed in prepared wall openings in accordance with manufacturer's instructions. The maximum allowable gap between the frame shall not be more than 5-8 mm and should be sealed with proper sealant once the frames are installed. It is critical that correct methods of installation are adopted to ensure that a doorset, when fixed into the wall, will achieve the fire rating designated for the opening.

It is strongly recommended that installation of fire doorsets is carried out by the manufacturer or, alternatively by installers trained in fixing the doorsets in accordance with the manufacturer's fixing instructions. The same shall be guaranteed by the manufacturer on completion of installation.

9.2.1.1 Compatibility of the surrounding structure

The type of surrounding structure or wall/partition into which a fire door can be installed will have to be determined by fire resistance test and should not be changed without agreed expert opinion or test evidence. The type of surrounding structure or wall/partition can exert an influence upon the fire performance of the assembly, hence it should be suitably fire rated. The manufacturer's recommendations should be followed with regard to the approved types of surrounding structure within which the door may be fitted.

9.2.1.2 Sealing between door assembly and surrounding structure

In order to maintain the fire resistance of a fire-resisting wall or partition when fitted with a door assembly, the junction between the two elements should be adequately sealed. Ideally a wall or partition should be built up to the rear of the door frame without gaps. This is not always possible, and to ensure easy installation of the door assembly, the opening should be made within the permissible tolerance of 5 mm on all three sides. The gap between door frame and wall opening can vary greatly and is usually masked with an architrave and/or with fire stop sealant. For partitions, the maximum gap shall not be more than 2.5 mm on all three sides.

9.2.2 Where grouting is required in masonry installations, frames shall be suitably braced or fastened in such a way that will prevent the pressure of the grout from deforming the frame members. Head members of frames shall not be grouted with the grout mixture. Grout shall be mixed with cement and sand slurry to a maximum ratio of 1 : 3.

Steel frames, including fire rated frames do not necessarily require grouting to achieve fire rating. Grouting shall not be used for frames installed in plasterboard walls.

Alternatively, use of fire rated polyurethane foam or such fire rated materials may be recommended for all kind of frames.

9.3 Door Installation

9.3.1 Doors shall be installed and fastened to maintain alignment with frames to achieve maximum operational effectiveness and appearance. Doors shall be adjusted to maintain perimeter clearances of maximum 3 to 4 mm. Shimming shall be performed by the installer as needed to ensure that the proper clearances are achieved.

9.3.1.1 Clearance gaps

Failure of fire-resisting door assemblies under test can be due to burn-through at the clearance gap between the door leaf edge and the door frame. Doors should be hung to give an equal gap across the head and down both jambs. A typical gap to achieve good fire performance is between 2 mm and 4 mm. With the exception of uninsulated fire doors, it is recommended

that all fire doors are fitted with intumescent seals or combined intumescent and smoke seals. Certain smoke seals might require a larger gap in order to operate without causing significant frictional increases, but the gap should remain within tested tolerances.

9.3.1.2 Under-door (threshold) gaps

Under-door (threshold) gaps should be in accordance with the manufacturer's installation instructions for the particular doorset design. When fitted, smoke seals should give an even contact with the floor but should not exhibit significant increased frictional forces that could interfere with the closing action of the door. The maximum undercut gap shall not be more than 19 mm, provided the same has been tested in similar condition (*see also 7.2.5*).

9.4 Hardware Installation

Installation of hardware items shall be in accordance with good practices and hardware manufacturer's recommendations/templates. Installation guide for doors and hardware and recommended practice for hardware if available shall be followed. All hardware shall be reinforced with appropriate reinforcement including screws and fasteners as suggested by the hardware manufacturer's manual.

9.4.1 Fixing of Smoke Seal

When it is necessary to fit seals on site, either in the frame or the door edge, it is important to follow the manufacturer's recommendations precisely for the type and mode of operation of the door concerned. Care is necessary when fitting self-adhesive seals to ensure that the groove is dry and free from dust or sawdust to ensure a good bond. The self-adhesive action deteriorates at lower temperatures, and additional mechanical fixing might be necessary if the seals are fitted at temperatures below 10 °C. Seals may be surface-mounted if they are sufficiently thin, but such seals are more prone to detachment than those fitted into grooves.

9.5 Installation of Factory Applied Finish Painted Materials

In addition to storage and handling precautions, it is imperative that the work of all other rough trades must be completed prior to the installation of factory applied finished painted product.

9.6 Door and Frame Maintenance

Once the doors and frames are installed, the owner or end user shall responsibly and properly maintain the doors and frames in accordance with good practices and as per the manufacturer's maintenance manual.

9.6.1 Fire doors are intended to provide a similar level of fire resistance as the fixed elements of building, for example, walls and floors, and evaluated by the similar procedures and criteria. However, since such doors are often opened and closed many times a day, this mobility is likely to cause a more rapid deterioration in the fire

resistance performance. This deterioration can take two main forms:

- a) Damage to the leaf or the components making up the assembly, and
- b) Wear and tear in the building hardware, or a reduction in the effectiveness of fixings, causing the door to fail to self-close, thereby resulting in a breach of the fire barrier.

It is important, therefore, for periodic inspection, maintenance and repair of any damage shall be undertaken on a regular basis, for the required fire resistance to be maintained. The marking of individual components can be an aid to the correct replacement of those components when necessary.

10 STORAGE, HANDLING AND INSTALLATION OF ROLLING SHUTTERS

10.1 Site Storage

All rolling shutters shall be stored horizontally under cover in the job site. The surface of the floor shall be flat and should have sufficient support for the hood. The slats shall not touch the floor and shall be rolled on to the hood. The minimum space under the rolled slats and floor shall be 100 mm. The place shall be dry and free from water or wet surface including wrappers. Proper site storage is important in maintaining the quality and integrity of the applied paint surface.

10.2 Mounting of Rolling Shutter

The mounting for rolling shutter shall be, either on the face-of-wall or between the jamb. Shutters mounted on the face of the wall and subject to damage from falling debris shall be protected by the building structure. Fire rated rolling shutters shall have minimum 800 mm head room clearance for fixing of hood and operator.

10.3 Supporting Construction

Walls shall be plumb and true, present smooth surfaces, and have a fire resistance rating as required by the competent authority. Walls shall be of brick, concrete, or concrete masonry unit construction except that, where hollow concrete masonry units are used, the wall opening shall be reinforced to provide anchorage for door-mounting hardware equal to that of brick or concrete. Heads of door frames and other structural openings shall be reinforced or suitable lintels shall be provided, depending on the type of wall construction and loads to be supported. Frames may not be required for rolling shutter installations. Where frames or jambs are provided, nominal structural steel or formed steel plate shall be used. Frames or jambs shall be in accordance with the manufacturer's listing.

10.4 Assembly Components

An automatic closing device shall be installed on every rolling shutter (motorized). Rolling shutter shall close automatically upon activation or release of a fusible link or detector. The automatic-door closing

mechanism shall be enclosed in a metal housing to protect the mechanism from debris and ensure operation in the event of fire. A governor, where employed on a door, shall have an integral mechanism working in coordination with the closing device and shall control the closing speed of the door.

Power operated fire doors are those that normally are opened or closed by power. They shall be furnished with a sensor that causes the door closer to stop or reverse upon contact with an obstruction under normal conditions. Power-operated fire doors shall be equipped with an automatic closing device that, upon activation, will cause the door to close irrespective of power loss or operation under normal conditions, and remain closed or be capable of opening and then reclosing until the automatic-door closing device has been reset.

10.5 Assembly of Rolling Shutters

10.5.1 Guides

The guides shall be mounted plumb and with sufficient clearances allowed for vertical expansion when exposed to fire. The guides used between jamb-mounted doors shall be either exposed or concealed in a pocket or wall reveal. Attachment of the door assembly to the wall shall be by means of through-wall bolts. As an alternative, expansion anchors shall be permitted to be used in concrete, brick, or filled concrete masonry unit walls if the following conditions are met:

- a) Expansion anchors shall be manufactured from steel and shall be zinc-coated or cadmium coated.
- b) Where used in brick or filled concrete masonry unit walls, the result of the shear and tensile load applied to the bolt shall not exceed 1/12th of the proof test load.
- c) No expansion anchor shall be set closer to the edge of the wall opening than six times the diameter of the anchor or closer to another anchor than eight times the diameter of the anchor.
- d) Where structural steel frames are used at jambs, guides shall be secured to the frame with machine bolts of not less than 9.5 mm in diameter.

10.5.2 Brackets

Brackets mounted on the face of the wall shall be bolted either to the wall or to an extension of the guide wall angle with not less than two through-bolts or machine bolts 12.7 mm in diameter per bracket. Brackets mounted between the jambs shall be secured to the lintel or to the side of the jambs by not less than two machine bolts of 12.7 mm diameter.

10.5.3 Hoods and Housings

Where the rolling shutter is mounted on the face of the wall or between jambs, the metal hood and housing shall be secured tightly to the brackets or wall. Where a flame baffle is provided, fusible link connection to

the flame baffle shall be permitted to be independent of the detectors or fusible link connections that activate the door's automatic door closing mechanism.

11 STORAGE, HANDLING AND INSTALLATION OF HORIZONTAL SLIDING DOORS

11.1 Site Storage

Sliding door panels should be stored horizontally under cover. The surface of the floor shall be flat and should have sufficient support at the bottom with wooden spacers. The panels shall not touch the floor and shall be covered with wrappers to avoid exposure to dust and water. The place shall be dry and free from water or wet surface including the wrappers. Proper site storage is important in maintaining the quality and integrity of the applied paint surface.

11.2 Sliding Door Panels

11.2.1 Sliding door panels shall be permitted to be single section or multiple sections. Connection between the panels shall be in accordance with the manufacturer's instructions and the individual published listing. Hollow metal or composite doors shall be furnished in not more than five panels, constructed for either field or factory assembly. For bi-parting doors, not more than four panels shall comprise a single leaf. Personnel swinging-type pass doors shall be permitted to be used if tested with the sliding door. The pass door shall be provided with hinges, latch set, and spring hinges or door closer.

11.2.2 Mounting of Sliding Doors

Horizontally sliding doors shall be wall mounted in a track attached to a wall in accordance with the manufacturer's instructions. When in the closed position, the clearance between the wall and the sliding door or the frame and the sliding door shall not be more than 19 mm. Unless tested otherwise, sliding doors shall lap openings at least 102 mm at the sides and top. Where sliding doors provide protection of openings located in walls above floor level and no projection sill is provided, the sliding door shall lap the bottom of the opening at least 102 mm. Bi-parting doors shall have an astragal securely attached in place so as to project a minimum of 19 mm unless otherwise required or permitted in the individual manufacturer's published listing.

11.3 Supporting Construction

11.3.1 Walls

Walls shall be plumb and true and have a fire resistance rating as required by the authorities. They shall be of brick, concrete, or concrete masonry; the wall opening shall be reinforced to provide anchorage for door mounting hardware equal to that of brick or concrete.

Attachment of the door assembly to the wall shall be by means of through-wall bolts. As an alternate, expansion anchors shall be permitted to be used in concrete, brick, or filled concrete masonry unit walls if the following conditions are met:

- a) Expansion anchors shall be manufactured from steel and shall be zinc-coated or cadmium coated.
- b) The compressive strength of the concrete shall not be less than 13.8 MPa (2 000 psi), and the bolt load shall not exceed the proof test load.
- c) Where used in brick or filled concrete masonry unit walls, the bolt load shall not exceed 1/12th of the proof test load. No expansion anchor shall be set closer to the edge of the wall opening than six times the diameter of the anchor, or closer to another anchor than eight times the diameter of the anchor.

11.4 Assembly Components

11.4.1 Closing Devices

Fire rated sliding doors shall be equipped with self-closing or automatic door closing devices to ensure that they shall close or be closed at the time of a fire. Closing devices shall be a system of weights or a certified closing device. Automatic closing doors shall not have a delay of more than 10 s in the initiation of closing or reclosing.

The average closing speed shall be not less 152 mm/s, not including any initial delay time. The average closing speed for doors used in buildings where access by the general public is not restricted, shall be not more than 610 mm/s.

11.4.2 Releasing Devices

Power operated doors not equipped with standby or emergency power shall be equipped with an integral or a separate labelled releasing device that shall automatically disconnect the door from the control of the power operator at the time of a fire. The releasing device shall be activated at the time of the fire by detectors or fusible links installed on both sides of the wall and interconnected so that the operation of the single detector or fusible link shall allow the door to be disconnected and closed. If closing is achieved by power operation, standby or emergency power shall be provided. The time delay from failure of normal power operation to emergency power operation shall not exceed 10 s. The standby or emergency power source shall be sufficient to operate a minimum of 50 closing cycles of the door. If door opening also is achieved by power operation, the standby or emergency power source shall be sufficient to operate a minimum of 50 opening and closing cycles of the door.

Power operation shall not allow opening if temperatures on either side of the door reaches 260 °C (500 °F).

11.4.3 Hardware

Only hardware certified for use with the door shall be permitted to be used. Fire door hardware shall include tracks, hangers, track brackets, bumpers, binders, pull handles, stay rollers, centre latch and centre floor stop if required, astragal, and centre binders. Tracks shall be flat, box, angle, J-section, or round. Tracks shall be inclined or level, depending on the manufacturer's procedure.

The wall bolts shall not be less than 15.8 mm in diameter. The bolt spacing depends on the manufacturer's specific test. Not less than two hangers shall be provided for each door. At least two binders shall be required on the vertical jambs and at least one shall be required at the head.

Bi-parting sliding doors shall be provided with the sill binders or centre guides if required by individual manufacturers. Stay rollers shall be installed in an approved manner. Where doors are power operated, centre-parting doors requiring a centre latch shall be provided with a fusible link arrangement that shall hold the latch in an unlatched position during day-to-day operation while causing the latch to operate and secure the door in the event of a fire. Handles shall be provided for opening the doors from either side. If flush pulls are used, they shall not be located back-to-back.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
208 : 1996	Door handles — Specification (<i>fifth revision</i>)	6248 : 1979	Specification for metal rolling shutters and rolling grills (<i>first revision</i>)
277 : 2018	Galvanized steel strips and sheets (plain and corrugated) — Specification (<i>seventh revision</i>)	6315 : 1992	Floor springs (hydraulically regulated) for heavy doors — Specification (<i>second revision</i>)
287 : 1993	Permissible moisture content for timber used for different purposes — Recommendations (<i>third revision</i>)	12817 : 2013	Stainless steel butt hinges — Specification (<i>second revision</i>)
513	Cold reduced carbon steel sheet and strip	14912 : 2001	Door closers, concealed type (hydraulically regulated) — Specification
(Part 1) : 2016	Part 1 Cold forming and drawing purpose (<i>sixth revision</i>)	16231 (Part 4) : 2019	Code of practice for use of glass in buildings: Part 4 Safety related to human impact (<i>first revision</i>)
(Part 2) : 2016	Part 2 High tensile and multi-phase steel (<i>sixth revision</i>)	SP 7	National Building Code of India: Part 4 Fire and life safety
1341 : 2018	Steel butt hinges — Specification (<i>sixth revision</i>)	(Part 4) : 2016	
3564 : 1995	Hydraulically regulated door closers — Specification (<i>fourth revision</i>)	(Part 8/Sec 2) : 2016	Part 8 Building Services: Section 2 Electrical and allied Installations.
		IS/ISO 3008-1 : 2019	Fire resistance tests — Door and shutter assemblies — Part 1: General requirements (<i>under preparation</i>)

ANNEX B

(Foreword)

GENERAL GUIDANCE FOR FIRE DOOR PERFORMANCE

B-1 GENERAL

B-1.1 Each class of device (for example, doors/shutters) has certain advantages and limitations, and the importance of each of these characteristics needs to be considered for the specific opening under consideration, based on performance. A device cannot be expected to perform properly except under the condition for which it was designed. This does not only include testing and meeting the provision of the standard but also the functionality of the product in use.

B-1.2 Fire door assemblies for the protection of openings depend on the use of labelled fire doors and frames, certified and labelled latching devices, swinging and sliding hardware, and closing devices having the required fire protection ratings that close or are closed at the time of fire. The effectiveness of the entire assembly as a fire barrier could be destroyed if any component is omitted or even if one of the component is substandard in quality.

B-1.3 Where fire doors are used in a means of egress, they are required to swing along the direction of exit travel except for doors on individual small rooms, which may be permitted to swing in. The following types of doors may not be permitted to be used on exits:

- a) Rolling steel doors or shutters, and
- b) Horizontal or vertical sliding doors.

B-1.4 Fusible link or similar door-closing arrangements are of limited value for exit purposes because quantities of smoke can pass through the door opening before there is sufficient heat to fuse the link.

B-1.5 Doors of small to moderate sizes are more suitable for exit purposes than very large doors because of the relative ease of operation of smaller doors.

B-1.6 Horizontally sliding doors for exit purposes are not suitable because they are difficult to reopen once they are closed in the case of fire. Swinging doors that are integral with the sliding fire doors are considered suitable if they are tested and certified and if they are furnished without any obstruction to clear the passage.

B-1.7 Any assembly provided in accordance with the provisions of this standard does not necessarily provide the same degree of protection against the spread of fire that is provided by the wall in which the assembly is installed, assuming that the wall has certain fire resistance. Therefore, the size and number of openings in any wall required to have fire resistance should be kept to the minimum necessary for the normal or emergency operation of the occupancy.

B-1.8 Safety glazing is also an important consideration when using glazing materials in fire door's vision pane and in fire resistance rated walls that could be subject to accidental human impact [see IS 16231 (Part 4)].

B-1.9 Access doors installed in a horizontal plane (horizontal access doors) for use in fire-rated floors, or floor-ceiling or roof-ceiling assemblies are designed to maintain the fire resistance rating of the building construction material. The size and number of such door openings should be limited in accordance with the fire-rated assembly. Horizontal access doors differ from access doors installed in the vertical plane (vertical access doors) because they are tested to perform as an essential component of the fire-rated assembly in which they are installed so that the rating of the entire assembly is maintained by the installation of the horizontal access door. Therefore, these doors do not have a fire protection rating. Vertical access doors, however, are tested in accordance with the same test used to measure the fire performance of standard size doors.

B-1.10 Fire doors, shutters, are of value only if properly maintained so that they close or are closed during the time of fire. Periodic inspection of doors/shutters, with immediate attention to any necessary repairs and correction of any defects that could interfere with operation, is an important responsibility of the management of the property.

B-1.11 The use of swinging, non-rated doors mounted in openings in fire walls, which could interfere with the closing of the fire doors, should not be permitted.

B-2 INSTALLATION AND MAINTAINANCE

The competent authority may decide upgrading of existing installations to meet current standards and requirements only where the lack of compliance with this standard presents a serious fire or life safety hazard. It should be noted that care and maintenance of materials for ongoing and existing installations should be maintained in accordance with the standards under which they were installed.

B-3 Electronic and similar storage of details of range of fire doors (model/variety) including their unique serial number and compliance to this standard should preferably be maintained for reference and use.

B-4 FIRE PROTECTION RATING

The fire protection rating of a fire door presumes that the door is installed with the appropriate frame, hardware, and other accessories required by this standard. In any instance where any of the required elements are not

supplied, omitted by the manufacturer of the door, the assembly rating is void for the purpose of this standard and the opening protection is not considered equivalent to the certified or otherwise indicated fire protection rating of the door component.

B-5 SUPPLY AND INSTALLATION

For the purpose of fire protection, fire rated door and hardware supplied by two different agencies will be construed as non-fire rated in nature. The door manufacturer shall not put fire rated label on such doors, where they have no control over the supply of such material. All components which forms a complete fire door assembly and qualifies the definition of fire door shall be supplied and installed by the door manufacturer or by its trained installer. The door manufacturer shall be responsible for the entire assembly. If required, the manufacturer shall give an undertaking in writing to the fire authority about the products supplied with proper certification and also confirming that the material was supplied by him as a complete assembly and installed at site as per certification. If there is any deviation in supplies (such as due to unforeseen reasons), the manufacturer should mention it to the competent authorities to enable them decide on (accepting or rejecting) the deviation. It is suggested to take prior approval in case of any deviation(s).

B-6 Doors are of several classifications, types, and methods of operation. Fire door assemblies consist of individually certified components that are essential for the satisfactory performance of the complete assembly. Some certification cover one or more components in addition to the door.

B-7 Fire doors/shutters, are of value only if properly installed so that they close at the time of fire. They should be self-latching, except if the certified fire door supplied is tested in unlatched condition. All fire doors shall be self-closing. Non-egress doors like horizontal and vertical shaft doors, may not have the self-closing device if the door under consideration is always in latched or locked condition.

B-8 Where the fire door assembly has components with different fire rating, then the components with the least fire rating will be considered as the rating of the assembly.

B-9 In communicating doors or connecting rooms between hotel sleeping rooms, the closing devices may be omitted with the approval of the competent authority. In a residential apartment's entrance door, there may be

an exception for not using a closing device as the door will remain always in closed condition.

B-10 Adequate spring power is essential for hydraulic door closers to close a fire door with sufficient force to overcome the resistance of the latching mechanism. However, too much spring power causes opening resistance and makes it difficult for the persons with disabilities, the elderly, and young children to open doors. *See also* Annex B of Part 3 'Development control rules and general building requirements' of SP 7.

Door closers may be classified in sizes from 2 to 6 with an increased closing force for higher numbers. Generally, a minimum size 4 or above closer should be used on exterior fire doors and a minimum size 3 or above closer should be used on interior fire doors. Door widths greater than 970 mm in exterior and 1 020 mm in interior parallel or single lever arm applications, and abnormal air pressures usually require an increase to the next size. A combination of these factors could necessitate an increase of two sizes. Individual manufacturer's recommendations should be consulted. Spring hinges should be adjusted to achieve positive latching when allowed to close freely from an open position of 30°.

B-11 Certified and labelled door holder/release devices for swinging doors should, wherever possible, be installed at the top of the door as close as possible to the lock edge and should be located to avoid interference with any other hardware. If necessary, the holder/release may be permitted to be located at the bottom of the door as close as possible to the lock edge with the device installed on the wall or floor.

B-12 Structural changes in the design of frame may have an impact on the fire rating of the door. Any changes in depth of frame or two-piece frame (both side architrave), use of sub-frames and pressure fixed frames should be based on proper test evidence and certification under third party certification program.

B-13 Fire door/shutters may lose their purpose unless they are properly maintained and closed or are able to close at the time of fire. A periodic inspection and maintenance program should be implemented and should be the responsibility of the property management. *See also* Annex B of Part 12 'Asset and facility management' of SP 7.

B-14 Hinges, catches, closers, latches, and stay rolls are especially subject to wear and needs maintenance.

ANNEX C*(Foreword)***SUPPLY/INSTALLATION OF FIRE DOORS****C-1 LETTER OF COMPLIANCE**

The typical letter for supply and installation of fire rated doors is given below:

To

The Owner or End User

Project Name

Location

Sub: Confirmation of supply and installation of fire rated doors and doorsets in (project name)

Ref: Certification numbers:

1) (Product type, Issuing lab, Date of issue)

2) (Product type, Issuing lab, Date of issue)

Further to the receipt of order (reference) we hereby confirm the following material has been supplied and installed as a complete assembly. The products supplied are detailed below vide (list of unique serial number of labelling) and are as per the above tested specimen.

Door Type	Size (Wall Opening)	Quantity	Door Classification Code	Unique Serial No. of Labeling	Invoice No.	Remarks
Fire door	1 000 × 2 100 900 × 2 400	100		xxxxxx Invoice No.		Fully compliant
Total doors		100				

As a primary supplier of fire door and hardware, we hereby confirm the products supplied and installed are covered under our certification programme/test reports (details enclosed). All hardware supplied are equally fire rated, the individual test certificates of components and door assembly are also attached herewith.

Door Manufacturer:

(sign and seal)

Encl: Copies of certificates-indicating date of testing and validity date

C-2 TYPICAL CONTENTS OF TEST REPORT

C-2.1 The detailed test report shall typically include the following:

- Name of testing laboratory,
- Name of sponsor,
- Date of test,
- Ambient temperature,
- Objective,
- Detailed construction specifications with drawings indicating the side of fire exposure, and method of fixing,
- Test procedure,
- Performance criteria,

IS 3614 : 2021

j) Results (tables/graphs/figures):

- 1) Temperature measurements; and
- 2) Observations

k) Conclusions.

C-2.2 A typical of the fire door test certificate is given below.

FIRE DOOR TEST CERTIFICATE

This is to certify that, the fire doorset has been tested and certified for fire rating in accordance with the fire door specification standard [IS 3614 : 2021] as manufactured by:

MANUFACTURER NAME (in bold)

Postal address of the factory

Telephone number

Email ID

Tested product

Insulated fire door/Uninsulated fire door

(Choose the relevant door category from the above)

XXXXXX

Certificate number as issued by testing laboratory

Contd/-

Date of test: 03 June 2021

Date of issue of test certificate: 03 June 2021

Validity of the test certificate: 02 June 2026

Issuing authority details:

Signed and sealed by the issuing laboratory.

MANUFACTURER NAME (in bold)

(Certificate number and manufacturer name to be included in every page)

This is to certify that the following specimen of fire door assembly has been tested for maximum of ____ minutes (specify actual fire rating) in accordance with IS 3614 : 2021 and IS/ISO 3008-1 : 2019

Product tested: < Mild steel fire doorset with (mention infill) material > or the relevant doorset

Category of test: Insulated doorset/Uninsulated doorset (select)

Doorset size: Single/Double leaf doorset of size (*indicate Width × Height*) with or without vision pane tested in latched/unlatched (*select relevant type*) condition Total square metre area including frame.

Testing criteria: Integrity: 123 minutes (*mention maximum rating, as recorded*)

Insulation: 48 minutes (*mention maximum minutes if it is an insulated door; as the insulation criteria is not applicable for uninsulated doors*)

Door Specification:

- 1.1 Frame profile size: (mention profile size)
- 1.2 Frame type: Grooved or Normal
- 1.3 Frame sheet thickness: (mention sheet thickness)
- 2.1 Door leaf thickness: (mention shutter thickness)
- 2.2 Door sheet thickness: (mention sheet thickness)
- 3.1 Vision pane size: (width × height)
- 3.2 Total area: ____ m²

Contd/-

Date of test: 03 June 2021

Date of issue of test certificate: 03 June 2021

Validity of the test certificate: 02 June 2026

Issuing authority details:

Signed and sealed by the issuing laboratory.

MANUFACTURER NAME (in bold)

(Certificate number and manufacturer name to be included in every page)

3.3 Type (Clear for entire duration of test)

4.1 Intumescent seal (only for insulated door) mention size and model

4.2 Smoke seal model and specification

Hardware Specification:

5.1 Hinges — size, model number, and make

5.2 Locking device — model number and make (latched or unlatched
(tested in latched or unlatched condition)

5.3 Flush bolts — model number, make (only for inactive leaf)

5.4 Door closing devices

5.5 Additional accessories (if any)

This is to certify that (manufacturer name) has successfully passed specimen doorset sample tested as per above specification. This test relates to fire doorset specification providing a maximum fire resistance of 123 minutes for integrity and 48 minutes of insulation (if tested for insulation) as defined in IS 3614 : 2021. This certification is limited to following conditions.

1. The doors are approved to be used on fire openings based on
 - a. Specimen sample tested.
 - b. Physical evaluation of sample door in line with the specification
 - c. Documentary evidence of various hardware including glass used, confirming the type and make.
 - d. Design parameters as submitted for sample inspection.

Contd/-

Date of test: 03 June 2021

Date of issue of test certificate: 03 June 2021

Validity of the test certificate: 02 June 2026

Issuing authority details:

Signed and sealed by the issuing laboratory.

MANUFACTURER NAME (in bold)

(Certificate number and manufacturer name to be included in every page)

2. The testing laboratory has conducted factory inspection and production control before testing the product. *(Include this clause only if the manufacturing facility is not BIS approved. If the laboratory does not have any factory inspection then the same should be mentioned).*
3. This certificate is limited to the specimen sample manufactured and installed as per IS 3614 : 2021 at the time of test. It does not allow for any deviation in maximum width and height as per IS 3614 : 2021
4. Doorset is tested as a complete assembly including vision pane. The maximum size of the vision pane cannot be more than the square metres of the glass pane tested. The maximum width of the vision pane cannot be more than the tested specimen, height(s) may vary as per IS 3614 : 2021
5. This certificate is for single swing, single or double leaf doorset. *(For double swing and double egress doors separate test needs to be conducted)*
6. If the doors are tested in latched condition, any latching device like mortise sashlock, latch lock and panic devices which is fire rated and backed by individual specimen test certificate or not. Use of dead bolts is not permitted.
7. For doors tested in unlatched condition, that is, with dead bolts (not engaged in the frame or inactive leaf of the door), it is acceptable to use any latched devices as mentioned in condition 6 above.
8. Any reduction or changes in location of the hardware other than the tested specimen may not necessarily give the similar performance of the tested specimen.

Contd/-

Date of test: 03 June 2021

Date of issue of test certificate: 03 June 2021

Validity of the test certificate: 02 June 2026

Issuing authority details:

Signed and sealed by the issuing laboratory.

MANUFACTURER NAME (in bold)

(Certificate number and manufacturer name to be included in every page)

9. The construction of the wall opening shall be of similar rating or more to have the intended fire resistance rating.
10. Labels shall be affixed on the doorset leaf with the certificate number and fire rating confirming if it is insulated or uninsulated door.
11. This test certificate is incomplete if it is not submitted along with the manufacturing and construction details as signed and attested by the laboratory.
12. This compliance certificate is based on the detailed test report as issued to the manufacturer. Further clarification on the test report can be obtained from the issuing authority as mentioned below:

Testing laboratory details for verification of test report:

Name of the contact person:

Contact number:

E-mail ID:

Enclosed: Construction details of the door, signed and sealed.

Date of test: 03 June 2021

Date of issue of test certificate: 03 June 2021

Validity of the test certificate: 02 June 2026

Issuing authority details:

Signed and sealed by the issuing laboratory.

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****END OF REPORT ****

ANNEX D*(Foreword)***COMMITTEE COMPOSITION**

Fire Safety Sectional Committee, CED 36

<i>Organization</i>	<i>Representative(s)</i>
In Personal Capacity (<i>K-33, Green Park, New Delhi</i>)	SHRI S. K. DHERI (Chairman)
Advance Firetec and Research Lab Pvt Ltd, New Delhi	SHRI S. K. NANDI SHRIMATI INDU SHARMA (<i>Alternate</i>)
Bhabha Atomic Research Centre, Mumbai	SHRI A. K. TANDLE
CSIR-Central Building Research Institute, Roorkee	SHRI SUVIR SINGH SHRI A. A. ANSARI (<i>Alternate</i>)
Central Industrial Security Force, New Delhi	SHRI RAJNATH SINGH SHRI A. K. VERMA (<i>Alternate</i>)
Central Public Works Department, New Delhi	SHRI CHAITANYA KUMAR VERMA SHRI M. V. CHALPATI RAO (<i>Alternate</i>)
Centre for Fire Explosive & Environment Safety, Delhi	DR K. C. WADHWA
Chennai Petroleum Corporation Limited, Chennai	SHRI J. P. K. HEPAT
City and Industrial Development Corporation, Navi Mumbai	SHRI ARVIND MANDKE
Delhi Fire Services, New Delhi	DIRECTOR CHIEF FIRE OFFICER (<i>Alternate</i>)
Delhi Metro Rail Corporation Limited, New Delhi	SHRIMATI PAPIYA SARKAR SHRIMATI RASHMI BHARDWAJ (<i>Alternate</i>)
Directorate General of Quality Assurance, Ministry of Defence, New Delhi	CONTROLLER QA (FE) JOINT CONTROLLER QA (FE) (<i>Alternate</i>)
Directorate of Fire and Emergency Services, Panaji	DIRECTOR
Engineers India Limited, New Delhi	SHRI SURESH MENON SHRI R. B. BHUTDA (<i>Alternate</i>)
Fire and Security Association of India, Gurugram	SHRI SURESH MENON
Fire Safe India Foundation, Mumbai	SHRI MILINDKUMAR DESHMUKH
FM Engineering International Limited, Bengaluru	SHRI SRIKANTH YAJJALA SHRI MANIKANDAN KRISHNAMOORTHY (<i>Alternate</i>)
Fyrprotek (Fire Engineers & Consultants), New Delhi	SHRI GULSHAN KHURANA
GAIL (India) Limited, New Delhi	SHRI D. P. NANDA SHRI R. P. SINGH (<i>Alternate</i>)
Hilti India Private Limited, Gurugram	SHRI BRIJBHUSHAN SINGH SHRI ARAVIND CHAKRAVARTHY (<i>Alternate</i>)
Indian Association of Structural Engineers, New Delhi	SHRI S. C. MEHROTRA SHRI SITARAM AGGARWAL (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
Indian Institute of Technology Roorkee, Roorkee	PROF VISHAL KUMAR PROF UMESH KUMAR SHARMA (<i>Alternate</i>)
Indian Oil Corporation Limited, Noida	SHRI AASHISH R. GOKHALE
Institution of Fire Engineers (India), New Delhi	SHRI U. S. CHILLAR SHRI M. S. PATYAL (<i>Alternate</i>)
J & K Fire and Emergency Services, Srinagar	SHRI V. K. SINGH SHRI BASHIR AHMED SHAH (<i>Alternate</i>)
Johnson Controls (I) Pvt Ltd, Pune	SHRI SANTOSH MUZUMDAR SHRI ASHISH D. SAWANT (<i>Alternate</i>)
Karnataka Fire Services, Bengaluru	REPRESENTATIVE
Lloyd Insulations (India) Limited, New Delhi	SHRI K. K. MITRA SHRI SANJEEV ANGRA (<i>Alternate</i>)
Maharashtra Fire Services, Mumbai	SHRI S. S. WARICK
Military Engineer Services (E-in-C's Branch), New Delhi	SHRI SANJAY AGARWAL LT COL SRIRAM SOMANCHI (<i>Alternate</i>)
Ministry of Home Affairs, New Delhi	SHRI D. K. SHAMI
Ministry of Petroleum & Natural Gas, New Delhi	SHRI S. C. GUPTA SHRI B. R. GADEKAR (<i>Alternate</i>)
Mumbai Fire Brigade, Mumbai	CHIEF FIRE OFFICER DEPUTY CHIEF FIRE OFFICER (<i>Alternate</i>)
NTPC Ltd, Noida	SHRI SANTOSH KUMAR JHA SHRI DOONDESHWAR V. (<i>Alternate</i>)
National Association of Fire Officers (NAFO), Mumbai	REPRESENTATIVE
Nohmi Bosai (India) Pvt Ltd, Gurugram	SHRI AJIT RAGHAVAN
Pacific Fire Controls, Delhi	SHRI RAKESH KUMAR ARORA SHRI DAKSH ARORA (<i>Alternate</i>)
Proion Consultants, New Delhi	SHRI SANDEEP GOEL
Reliance Refineries Limited, Jamnagar	SHRI VARADENDRA KOTI SHRI UMESH KHANDALKAR (<i>Alternate</i>)
State Bank of India, Mumbai	SHRI VINAYAK GOKHALE FIRE OFFICER (<i>Alternate</i>)
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In personal capacity (<i>A-45, Sector-70, Noida</i>)	DR H. S. KAPRWAN
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Composition of the Drafting Group of IS 3614 under CED 36

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Shakti Hormann Pvt Ltd, Secunderabad	SHRI SYED MOHAMED SHRI MAHESH KUMAR SINGH (<i>Alternate</i>)

(Continued from second cover)

An informative annex (*see* Annex B) on general guidance for fire door performance requirement has been introduced. Another such informative annex (*see* Annex C) on supply/installation of fire doors has been included.

The composition of the Committee responsible for formulation of the standard is given in Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be same as that of the specified value in this standard.

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